

**GEYSERS POWER COMPANY, LLC
STEAMFIELD GATHERING AND DISTRIBUTION FACILITY**

**TITLE V PERMIT EVALUATION
Statement of Basis**

INTRODUCTION:

Title V of the 1990 Clean Air Act Amendments requires all major stationary sources of air pollution to apply for a federal operating air permit which consolidates all applicable regulations and requirements into one document. In the state of California implementation of the Title V program has been delegated to the local air pollution control districts.

The Geysers Power Company, LLC operates 13 geothermal power plants within the jurisdiction of the Northern Sonoma County Air Pollution Control District. In May of 1999 the Geysers Power Company purchased the associated steamfields for the power plants from Unocal. The steamfields referred to as the “steam gathering and distribution facility” became subject to Title V. The steamfield operation has been renamed the “Geothermal Steamfield Operations and Maintenance Facilities”.

This evaluation covers the permitting of the steamfield operation.

Several minor modifications were completed under District Authorities to Construct since the initial Title V permit was issued.

In addition this Title V permit renewal is also subject to the Tailoring Rule requirements for greenhouse gases (GHG) as of July 2, 2011. GHG emissions from the steamfield operations are less than 10,000 tons per year. There are no GHG applicable requirements for operations covered by the Steamfield Gathering and Distribution facility. A GHG emissions inventory based on a mass balance of fugitive emissions and emissions from combustion equipment, the primary sources of GHG emissions from the stationary source, have been calculated for this Title V permit renewal.

PROCESS DESCRIPTION:

Geothermal steam, a naturally occurring resource in the Geysers area of Sonoma County, is collected from wells drilled from three to ten thousand feet into the geothermal reservoir and transported via pipelines to the power plants where the steam is expanded across turbines to produce electricity. The steam passes from the turbines through condensers and is condensed into water. The condensed water is sent to a cooling tower where residual heat is transferred to the ambient air, cooling the water. The cooled water is used to condense steam once again completing the cycle. More steam is condensed

than is needed in the cooling water cycle. This additional condensate is referred to as "blowdown" and is reinjected into the ground to replenish the steam field.

Geothermal steam consists of a small amount of gasses which do not condense with the steam. The non-condensable gasses include hydrogen sulfide (H_2S), an odorous gas, which is treated at the power plants and CO_2 .

The individual power plants are sources of a variety of pollutants of which H_2S is the primary pollutant of concern. The individual power plants have been issued Title V permits.

There are additional emissions associated with steamfield activities. These activities include steam pipeline stacking, pipeline and well blowdowns, individual well bleeds and well workovers.

Steam pipeline stacking occurs when a power plant is unable to receive the steam generated at the individual wellheads. When a power plant is taken off line in an abrupt manner the steam bypasses the power turbine and is released to the atmosphere through a stacking muffler. Over the years improvements have been made to the steamfields, namely intertteeing the individual plant steam transmission lines, so that in the event an individual power plant is unable to receive steam, the steam can be diverted to the other power plants. These improvements and the subsequent drop in steamfield pressure have decreased steam stacking considerably over the years. Stacking is now a rare occurrence.

Pipeline and well blowdowns are utilized to clear an individual well or section of pipeline by allowing high velocity steam to clear any obstructions which may hinder the transport of steam. The well or section of pipeline is opened to the atmosphere for a limited time to allow high velocity steam to clear any materials which may be restricting the steam flow under normal operating conditions.

Individual wells are placed on bleed when a steam well is shut in. A fraction of steam must be allowed to flow in order to prevent damage to the well. This is accomplished by opening a one-quarter inch valve on the well head. H_2S emissions associated with well bleeds are limited to no more than 0.5 kg/hr.

On a periodic basis individual wells need to be "worked over" to remove any bridges which may have formed in the well restricting the amount of steam flow. On these occasions a drilling rig is brought to the well pad. The well is cleaned by drilling out any obstructions in the well. During workover events emissions of H_2S and particulate matter are released. There are also combustion emissions associated with the operation of diesel rigs and compressors. An individual workover may last from several days to several weeks depending on the severity of the restriction.

In addition the Paint Spray Booth associated with maintenance operations at the West Geysers Administration building has been incorporated into this Title V permit. Maintenance activities include the application of primers and coatings to various parts and piping utilized at the steamfield.

PERMITTING STRATEGY

The geothermal transmission lines and associated steam wells were permitted over a ten year period between 1973 and 1983 as the individual steam fields were developed for the corresponding power plants. Steamfield and power plants in existence prior to the formation of the District were also issued permits during this period.

The Title V Operating Permit incorporates permit conditions from all the local Air Pollution Control District Permits to Operate including those federally enforceable into one document. For the purposes of streamlining the Title V permit the individual well permits, of which there were 7 versions, have been streamlined into one version encompassing the most stringent requirements of each version.

All requirements in the Title V Operating Permit have been labeled either locally (L), State (S) or federally (F) enforceable. All relevant PSD permit conditions have been incorporated in the Title V Operating Permit and are federally enforceable. The plant is not subject to any New Source Performance Standards (NSPS) or the Title IV Acid Rain Program.

EMISSION CALCULATIONS AND ASSUMPTIONS

Emissions from the steamfield are released from pipeline operations and from individual wells. Emissions from the transmission pipelines occur from stacking events, pipeline blowdowns, miscellaneous pipeline activities such as seasonal freeze protection, condensate collection system testing and miscellaneous fugitive leaks. Well emissions are associated with well bleeds, well blowdowns, well testing, well workovers and fugitive leaks. The emissions inventory for 2010 was used to estimate emissions from the steamfield transmission lines and wells.

VOC emissions are based on the amount of coatings used and the corresponding VOC content of the coatings.

STEAM TRANSMISSIONS LINES AND WELLS

H2S: 9.5 TPY

PM: 1.5 TPY

NOx: 71.1 TPY

SO2: 0.004 TPY

CO: 6.6 TPY

CH4: 6.8 TPY

CO2: 9,773 TPY

CO2e: 9,973 TPY

COATING OPERATIONS

VOC: 3.4 TPY

WELL REWORK ACTIVITIES

Combustion emissions from engines and compressors are based on conservative estimate that 13 wells will be reworked in any given year. The total engine hours and compressor hours are estimated to be 5,616 and 4,680, respectively.

NOx:

$$(16.1 \text{ lb/hr})(5,616 \text{ hr/yr}) + (11.07 \text{ lb/hr})(4,680 \text{ hr/yr}) = 142,225 \text{ lb/yr} = \mathbf{71.1 \text{ TPY}}$$

CO:

$$(1.5 \text{ lb/hr})(5,616 \text{ hr/yr}) + (1 \text{ lb/hr})(4,680 \text{ hr/yr}) = 13,104 \text{ lb/yr} = \mathbf{6.6 \text{ TPY}}$$

SOx:

$$(1.4 \text{ lb/hr})(5,616 \text{ hr/yr}) + (0.9 \text{ lb/hr})(4,680 \text{ hr/yr}) = 12,074 \text{ lb/yr} = \mathbf{6.0 \text{ TPY}}$$

PM:

$$(0.128 \text{ lb/hr})(5,616 \text{ hr/yr}) + (0.18 \text{ lb/hr})(4,680 \text{ hr/yr}) = 1,561 \text{ lb/yr} = \mathbf{0.8 \text{ TPY}}$$

CO2:

$$(10,296 \text{ hr/yr})(85 \text{ gal/hr})(0.4264 \text{ tonnes CO}_2/\text{bbl})(1 \text{ bbl}/42 \text{ gal})(1.1 \text{ ton/metric ton}) =$$

9,773 TPY

COATING OPERATION ACTIVITIES

VOC:

$$(1,250 \text{ gallons per year})(5.5 \text{ lb VOC/gallon}) = 6,875 \text{ lb/yr} = \mathbf{3.4 \text{ TPY}}$$

APPLICABLE REQUIREMENTS

The proposed permit contains conditions stipulate that the following applicable requirements, including all applicable federal requirements, will be satisfied. All referenced District rules are applicable federal requirements except Rule 455(b) which is an applicable state and local requirement and has been listed in italics.

1. Regulation 1 Rule 400(a) General Limitations-Public Nuisance prohibits a person from discharging from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have the natural tendency to cause injury or damage to business or property. Operation of the steamfield within the H2S limitations stipulated in Regulation 1 Rule 455 precludes the source from becoming a public nuisance.
2. Regulation 1 Rule 410- District Rule 410 limits emissions from any source to Ringelmann 2.0 for a period or periods aggregating more than 3 minutes in any hour.
3. Regulation 1 Rule 420- A person shall not discharge particulate matter into the atmosphere from any non-combustion source in excess of 0.2 grains per cubic foot or in total quantities in excess of the amount shown in Table I; 40 lb/hr, whichever is the more restrictive condition.
4. Regulation 1 Rule 430- Fugitive Dust Emissions are not an issue. The area around the power plant has been paved with asphalt to minimize dust from vehicular activity.

5. Regulation 1 Rule 455(a)-No person shall discharge into the atmosphere from any geothermal operation sulfur compounds, calculated as sulfur dioxide, in excess of 1,000 ppmv.
6. Regulation 1 Rule 492 (40 CFR part 61 Subpart M)-Asbestos. In the event asbestos containing material must be removed from the plant, the procedures listed in 40 CFR part 61 Subpart M will be followed.
7. Regulation 1 Rule 540-Equipment Breakdown. The operator of this source shall follow the procedures stipulated in Rule 540 in order to petition for breakdown relief.
8. Regulation 2-Open Burning. Any type of open burning at the facility shall comply with the requirements of Regulation 2.
9. Regulation 5-Federal Operating Permit. Application for and issuance of this operating permit fulfills the requirements of Regulation 5 and 40 CFR part 70, Title V.
10. 40 CFR part 68- Accidental Release Prevention and Management Program. In the event that this stationary source becomes subject to part 68 the operators of the source shall submit a risk management plan (RMP) by the date specified in part 68.10
11. 40 CFR Part 82-Chlorinated Fluorocarbons. The operator of this source shall use proper procedures in recycling chlorofluorocarbons.

RECOMMENDATION

Issue a Title V Operating Permit to Geysers Power Company for the Steamfield Gathering and Distribution Facility.

By: Alex Saschin, Air Quality Engineer

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